Effectiveness of Autogenic Relaxation Training on Children and Adolescents With Behavioral and Emotional Problems

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ABSTRACT

Objective: To investigate the effectiveness of autogenic relaxation training in a mildly disturbed outpatient population of children and adolescents with mostly internalizing symptoms, and/or some aggressive, impulsive, or attention deficit symptoms. **Method:** Fifty children and adolescents from southern Germany (mean age 10.2 years; range 6–15 years; mostly intact middle class family background) participated in a group intervention program. Fifteen patients were randomly assigned to a waiting-list control group. Behavior symptoms (Child Behavior Checklist), psychosomatic complaints (Giessen Complaint List), and level of stress were assessed before and after the intervention or after the waiting phase. Individual goal attainment was evaluated at the end of the intervention and in a 3-month follow-up. **Results:** The parent report on CBCL reflected reduced symptoms compared with control. The child report indicated reduced stress and psychosomatic complaints both in the intervention and control group, and no significant group × time interaction effects occurred on these scales. Effect sizes of 0.49 in the CBCL and 0.36 in the complaint list indicated clinically relevant effects of the intervention compared with the control group. At the end of the intervention, 56% of the children and 55% of the parents reported partial goal attainment, 38% of the children and 30% of the parents reported complete goal attainment; 71% of the parents confirmed partial goal attainment 3 months postintervention. **Conclusions:** Autogenic relaxation training is an effective broadband method for children and adolescents. *J. Am. Acad. Child Adolesc. Psychiatry*, 2003, 42(9):1046–1054. **Key Words:** autogenic relaxation training, effectiveness, group intervention.

In the treatment of children and adolescents relaxation techniques are being utilized by health-care professionals and child psychotherapists ever increasingly. Many different relaxation techniques are applied to children and adolescents, often embedded in multimethod treatment protocols (Friebel, 1994; Petermann and Petermann, 1993). Careful evaluation of treatment effectiveness is needed to decide whether a specific relaxation method can be recommended for a specific indication. This study evaluates a group intervention of autogenic relaxation training

(ART) applied to school-age children and adolescents with mild to moderate behavioral and/or emotional problems.

ART is an autohypnotic relaxation method developed in the 1930s by the German psychiatrist and neurologist J.H. Schulz (Schulz, 1966). The method is widespread, especially in German-speaking countries, both in clinical and nonclinical settings. By repeated concentration on specific autosuggestions a state of physical relaxation is achieved, which (after some training) is accompanied by psychological relaxation. This "autogenic" shift is considered to be the result of passive concentration on the content of the standardized autosuggestions. ART is regarded as a method to enhance effective coping with stress in healthy populations, and it is also used as a basic psychotherapy. The effectiveness of ART in adults has been demonstrated in multiple studies with a broad spectrum of clinical indications (for a meta-analysis, Grawe et al., 1994).

The practicability of ART for children has been reported repeatedly (Biermann, 1975; Langenkamp et al., 1982; Polender, 1982a,b), mostly with some modifications of the technique that was developed for adults by J.H. Schulz.

In an experimental study, Kelton and Belar (1983) demonstrated that children are able to increase their hand temperature significantly during a sequence of sessions with ART alone or with a combination of ART plus thermal feedback. ART is considered a broadband preventive and therapeutic technique for children and adolescents with sleeping problems, nervousness, emotional irritability, recurrent headache, hyperactivity, attention problems, fatigue, and anxiety (Biermann, 1975; Heinrichs and Neidhardt, 1998; Klein-Heßling and Lohaus, 1999; Kröner and Steinacker, 1980; Kröner and Langenbruch, 1982; Raudszus-Nothdurfter, 1992). The method has also been applied to children with chronic medical conditions such as diabetes mellitus (Göhr et al., 1997), bronchial asthma (Gröller, 1991), and kidney diseases (Fuhrmann, 1989) to support coping with disease-related stressors and to enhance adequate perception of disease-related complaints and symptoms. King et al. (1998) consider relaxation techniques as coping skills and propose that relaxation training provide the child with a means of combating feelings of discomfort in stressful situations at school or at home.

There is a lack of randomized and controlled studies of the effectiveness of ART in children and adolescents. According to the criteria for empirically supported treatments (Chambless, 1998; Chambless and Hollon, 1998; Chambless et al., 1996), there is sufficient evidence that ART is an efficacious treatment for recurrent migraine and tension headache (Engel et al., 1992; Labbé, 1995; Labbé and Williamson, 1984; for a review of empirically validated treatments for pediatric headache, see Holden et al., 1999). For other indications in children and adolescents, only few randomized and controlled studies have been reported, and these produced contradictory findings. Kröner and Steinacker (1980) reported that neuroticism and anxiety measured by a personality self-report inventory and parental judgement were significantly reduced in their therapy group compared with a control group. Kröner and Langenbruch (1982) treated 10-year-old children with attention deficits and found a significant improvement in two of three measures of attention after treatment, whereas the control group did not change or changed significantly less. Kaltwasser and Breitenbach (1986) treated 6- to 7-year-old children with speech disorders with ART and found no significant improvement in attention scores compared with a control group. Heinrichs and Neidhardt (1998) treated 54 school-age children and adolescents with a combination of ART and cognitive training and demonstrated a significant reduction of test anxiety in the intervention group compared with a control group. Frey (1978) coached children with dyslexia 1 hour per week over 1 year and found a significantly greater decrease of reading and writing faults in a group of children additionally taught in ART compared with children who were educated only in reading and writing abilities. Dittmann (1988) found no evidence of suitable predictors for the clinical or physiological effects of ART in children and adolescents, nor were any criteria found for differential indications. Some more studies of the effectiveness of ART with children cannot be interpreted seriously because of major methodical restrictions such as small sample sizes, missing control groups, and uncontrolled mixing of ART with other intervention strategies. In summary, there is not sufficient empirical support for ART as a broadband therapeutic strategy in children and adolescents. However, according to the literature review, the method might be a promising basic psychotherapy for a broad spectrum of indications.

The purpose of this study was to evaluate ART as a group intervention in a heterogenous population of school-age children and adolescents with mild to moderate behavioral and emotional problems. Three main hypotheses were investigated:

1. ART reduces multiple internalized and externalized symptoms as reported by parents on the Child Behavior Checklist (CBCL) (Achenbach, 1991).
2. ART reduces a broadband spectrum of somatic complaints as reported by children and adolescents in a standardized measure.
3. ART reduces the extent of stress as perceived in specific situations by children and adolescents in a standardized stress questionnaire.

In accordance with the definition of therapy effectiveness proposed by the American Psychological Association (1995), we wanted to study the effectiveness of the method under "real-world" clinical conditions, taking into account the "extent to which the intervention will be effective in practice setting where it is to be applied, regardless of the efficacy that may have been demonstrated in the clinical research setting" (p. 10). Therefore, we chose an outpatient pediatric setting for our intervention.

METHOD

Participants

The intervention was designed for school-age children and adolescents. Pediatricians or pediatric psychologists directly referred 32%

of the participants for the intervention program, and 68% applied for the intervention by responding to a report about the study in local newspapers. Children with low reading ability or apparent general cognitive deficits were excluded from the study because they were not able to fill out the evaluation instruments. Cognitive dysfunctioning was defined by a child's inability to follow the initial interview or to read and understand the questionnaires at T_1. The total sample size was determined by the capacity of the two participating therapists within the time frame of the project.

The mean age of the participating 25 girls and 25 boys was 10.2 years (SD 2.4 years, range 6–15 years). All children and adolescents were white; 76% lived in a two-parent family, 6% in a stepfamily, and 18% with a single parent. The families had a mean of 2.4 children. The occupational status of the parents indicated a predominance of social middle class.

All parents reported behavioral problems or somatic complaints of their children, but only 14% had requested psychotherapy or medication for their children before participating in the study. All participants were diagnosed by a pediatrician or a general practitioner before the beginning of the intervention and a somatic causation of the symptoms had been excluded. The main complaints as reported by the parents and/or children were recurrent headache (46%), sleeping problems (36%), attention problems (32%), hyperactivity (30%), recurrent abdominal ache (18%), and nervousness (14%). Multiple complaints and/or behavior problems were frequent (mean 2.3 complaints, SD 0.99, range 1–5). At the beginning of the intervention, 90% of the participants reported chronic symptoms, and only 10% of the participating children had developed their symptoms within the past 6 months. The frequency of the symptoms ranged from 2 to 3 times per month (8%) through 1 to 2 times per week (28%) to more than twice a week (64%).

Measures

We used a multi-informant and multimethod assessment approach as recommended by Kendall and Morris (1991). The children and their parents filled in a battery of psychometric questionnaires before the beginning of the intervention (T_1). The assessment was repeated after the intervention or after the waiting time for the control group (T_2).

The CBCL (Achenbach, 1991) is a widespread parent-report broadband measure of children's and adolescents' behavioral and emotional problems. We used the syndrome scales of the German version (Arbeitsgruppe Deutsche Child Behavior Checklist, 1998) with reference data from a German population-based study (Döpfner et al., 1998). The CBCL contains 113 items rated on a 3-point scale from 0 to 2. The items are aggregated to nine syndrome scales: Social Withdrawal, Somatic Complaints, Anxiety/Depression, Social Problems, Obsessive-Compulsive Behavior, Attention Problems, Delinquency, Aggressive Behavior, and Other Symptoms. Two secondary scores (Internalizing and Externalizing behavior) and a global score are derived from the nine primary syndrome scales. As reported by Döpfner et al. (1994), the German version of the CBCL syndrome scales has good to excellent internal consistency ($\alpha > .80$) and proven factorial validity comparable with the American version of the questionnaire.

The Giessen Subjective Complaint List for Children (GBB-KJ) (Brähler, 1992; Prehler et al., 1992) is a self-report questionnaire on physical complaints with 59 items from the areas general well-being, vegetative complaints, pains, emotionality, and general complaints. The children are asked to estimate the frequency of each symptom on 5-point rating scales (never/rarely/sometimes/often/always). As a result of a factor analysis, different complaint dimensions can be measured on five scales: Exhaustion, Gastric Complaints, Pains in Limbs, Circulatory Problems, and Cold Symptoms. The sum of these five

scales is the score for overall somatic complaints. For this global scale, good internal consistency (Cronbach $\alpha = .90$) is reported (Prehler et al., 1992). For the descriptive analysis, gender- and age-related German norms that have been reported by the authors of the questionnaire were utilized by transforming the raw scores of the individuals into percentile scores.

The Childhood Stress and Coping Questionnaire (SSK) (Lohaus et al., 1996) measures the level of stress in specific situations and the corresponding coping mechanisms as perceived by children. We used the SSK scale Intensity of Actually Perceived Stress. The children are asked to imagine eight specific situations (e.g., "imagine you have to speak in front of your class and you are not able to do so"). For each situation, the children are asked to estimate the extent of subjectively perceived stress on a 4-point rating scale (no/some/much/very much stress), as if they were in the situation described in the questionnaire. The raw score of the scale is transformed to gender- and age-related stanine scores. The authors of the questionnaire reported a medium internal consistency of the scale (Cronbach $\alpha = .69$). The external validity of the SSK has been established by medium correlations with different questionnaires measuring anxiety, neuroticism, and quality of life.

Sociodemographic data were collected at T_1. At this time point, all children and parents were interviewed and asked to specify individual therapy goals and to anticipate different levels of goal attainment (Kiresuk and Sherman, 1968) on a 3-point scale (0 = goal failed, 1 = goal partially attained, 2 = goal completely attained). The participating children and their parents evaluated their goal attainment in an interview after the intervention. In a telephone interview 3 months postintervention, the parents were asked to rate the persistence of individual goal attainment. All interviews were conducted by one of the therapists (K.S.).

Design and Procedures

The participants of the study were matched on age. Then within each set of similarly aged subjects, a certain fraction of the participants was randomly assigned to the intervention group, which started within 2 weeks after the first assessment (together 36 participants in three subgroups) or to the waiting list groups (16 participants). The waiting group received the intervention 12 weeks later. Our procedure guaranteed all subjects the same probability of being assigned to the intervention versus the control group.

The first assessment (T_1) was done in single appointments with the participants and their parents within 2 weeks before the beginning of the intervention. With the participants in the waiting groups, the second assessment (T_2) was done after the waiting phase of about 12 weeks before the beginning of the first session of their intervention. With the participants of the intervention group, the second assessment (T_2) was performed after the last session of the intervention phase. All participating children and adolescents were followed up per telephone interview with their parents 3 months postintervention. One boy dropped out of the study because he did not continue with the intervention. One child from the control group could not be integrated into data analysis because of missing data. Finally, 35 cases in the intervention group and 15 cases in the control group could be analyzed.

The ART was performed using a version modified for school-age children (a detailed treatment manual is available on the Journal's Web site at *www.jaacap.com* using the Article Plus feature). All participants were assigned to groups of 9 to 12 children or adolescents of either 6 to 11 years or 11 to 15 years. Eight sessions of 30 minutes each were performed once a week. The intervention took place in a physiotherapy room of an outpatient pediatric university clinic. The relaxation units of about 10 minutes each were embedded in a child-

centered framework of play activities and conversation. During the group sessions the six basic exercises of ART were taught. The relaxation training was done lying down with eyes closed. Within the group sessions, the text of the (auto-)suggestions was spoken repeatedly by the therapist. The children were encouraged to keep the short suggestions in mind and to use them more and more automatically by themselves. The children's experiences during the relaxation units were discussed afterwards.

The children and adolescents were strongly encouraged to perform the ART at home once or twice a day. The written text of each exercise was given to the children at the end of the group sessions for at-home practice. Protocol sheets were used by the children and adolescents to write down the time and the subjective effectiveness of their home practice. Parents were asked to support their children by showing interest in their home practice but not to control them directly. At the beginning of each group session, the participants reported about their experiences with the method at home both orally and by the remarks on their home protocols. If necessary, the children received individual instructions by the therapist to improve their relaxation technique.

Data Analysis

Means and standard deviations were calculated for the complete study group at T_1, and for the intervention group and the control group at T_1 and T_2. Significance of mean differences from T_1 to T_2 was investigated with paired t tests, both for the intervention group and for the control group. For each scale of the psychometric questionnaires, a group $\times$ time repeated-measures analysis of variance was computed. Effect size values were calculated by dividing the posttreatment therapy–control group difference by the control group standard deviation, as proposed by Grawe (1992) for control group designs. All statistical analyses were done with the software package SYSTAT 8.0.

RESULTS

Behavior, Somatic Complaints, and Stress at T_1

Compared with age- and gender-related normative samples, the study group scored above average in terms of the level of parent-reported behavioral and emotional symptoms and within the normal range in terms of self-reported somatic complaints and perceived stress. Means and standard deviations are demonstrated in Table 1. Parent-reported Internalizing behavior problems in the CBCL/4–18 were on average more than 1 standard deviation above the mean of the normative samples ($T = 63.3$). To determine whether the intervention group and the waiting group differed at T_1, we compared both groups on the sociodemographic variables and in the mean scores in the primary dependent variables reported in Table 1. No significant between-group differences were found.

Treatment Outcome

Paired t tests were computed to investigate the significance of pre–post mean differences in the intervention group and in the waiting list control group. We found a

TABLE 1
Baseline of Behavior Problems, Bodily Complaints, and Level of Stress in the Study Group at T_1 ($N = 50$)

Questionnaire/Scale	Mean	SD
CBCL 4–18		
Global T score	62.4	8.4
Internal T score	63.3	8.6
External T score	57.6	9.0
Subscales (raw scores)		
Social Withdrawal	3.4	2.5
Bodily Complaints	2.7	2.5
Anxiety/Depression	6.2	4.8
Social Problems	2.3	2.3
Schizoid/Compulsive	0.9	1.1
Attention Problems	5.6	4.0
Delinquent Behavior	1.9	1.9
Aggressive Behavior	8.9	5.9
Other Behavior Problems	6.7	4.2
Giessen Complaint List (GBB-KJ)		
Overall complaints (percentile)	58.7	30.5
Stress and Coping Questionnaire (SSK)		
Overall level of stress (stanine)	5.3	1.9

Note: CBCL = Child Behavior Checklist.

significant decrease of behavioral and emotional symptoms on all subscales of the CBCL/4–18 with the exception of the subscales Social Problems and Delinquent Behavior and a significant decrease of self-reported stress and overall somatic complaints in the intervention group. Changes in the desired direction could also be demonstrated for the control group in the Childhood Stress and Coping Questionnaire and in the Giessen Complaint List. Table 2 demonstrates the change over time in the primary scales.

The results of the 2 $\times$ 2 ANOVAs are presented in Table 3. The group $\times$ time interaction represents the extent to which the two groups showed differential rates of change. Significant interaction effects appeared in the Externalizing behavior dimension and in the global T score of the CBCL/4–18, a trend into the desired direction was found in the Internalizing dimension of the CBCL/4–18. On the CBCL subscale level, significant interaction effects could be observed on the Obsessive-Compulsive symptom scale and on the Other Behavior Problems scale. No significant group effects appeared. Significant main effects of time could be demonstrated for the global scale of the CBCL/4–18, for the global scale of the Giessen Complaint List, and for the perceived level of stress as measured with the Childhood Stress and Coping Questionnaire.

To assist in cross-study comparisons, we also computed the conventional effect size estimate d (Cohen, 1988) for

TABLE 2
Means and Standard Deviations of the Intervention Group (n = 35) and the Control Group (n = 15)
at T_1 and T_2, Including t Statistics[a]

| | Therapy Group | | | | | | Control Group | | | | | |
| | T_1 | | T_2 | | | | T_1 | | T_2 | | | |
Variable	Mean	SD	Mean	SD	t	p	Mean	SD	Mean	SD	t	p
CBCL 4–18												
Social Withdrawal[b]	3.4	2.7	2.2	2.8	3.1	.004**	3.4	2.0	3.2	2.2	0.6	NS
Bodily Complaints[b]	2.9	2.8	2.0	1.6	2.6	.012*	2.1	1.8	2.1	2.1	0.0	NS
Anxiety/Depression[b]	6.3	5.0	4.3	4.2	3.1	.004**	6.1	4.5	5.6	3.7	0.5	NS
Social Problems[b]	2.1	2.1	1.9	2.4	0.8	NS	2.7	2.7	2.7	2.4	0.1	NS
Obsessive-Compulsive[b]	1.0	1.1	0.5	0.9	3.2	.003**	0.7	1.0	0.7	1.4	−0.3	NS
Attention Problems[b]	5.5	3.9	4.1	3.4	3.4	.002**	5.7	4.3	4.9	3.7	1.3	NS
Delinquent Behavior[b]	2.1	2.0	1.7	1.8	1.5	NS	1.7	1.8	1.9	2.0	−1.1	NS
Aggressive Behavior[b]	8.9	5.6	6.6	6.2	3.4	.002**	8.9	6.6	8.3	5.6	0.9	NS
Other Behavior Problems[b]	6.9	4.1	3.7	2.7	5.4	<.001***	6.3	4.4	6.1	4.7	0.4	NS
Internal T score	63.6	9.0	58.0	9.8	4.2	<.001***	62.7	7.9	61.3	9.6	0.7	NS
External T score	57.7	9.1	53.9	9.6	3.8	.001***	57.5	9.2	57.1	7.2	0.4	NS
Global T score	62.5	8.4	56.6	9.6	5.5	<.001***	62.1	8.9	61.1	9.2	0.8	NS
SSK												
Overall perceived stress (stanine)	5.5	1.7	2.4	2.0	9.0	<.001***	4.8	2.2	2.1	1.5	6.0	<.001***
GBB-KJ												
Overall complaints[b]	28.7	14.6	20.7	16.8	4.5	<.001***	34.1	19.5	26.5	17.0	2.2	.046*

Note: CBCL = Child Behavior Checklist; SSK = Childhood Stress and Coping Questionnaire; GBB-KJ = Giessen Subjective
Complaint List for Children; NS = not significant.
* p < .05; ** p < .01; *** p < .001.
[a] Paired t tests, df = 34 for all tests within therapy group, df = 14 for all tests within control group except SSK: df = 13.
[b] Raw scores.

the primary scales at T_2. The effect size value indicates the clinical relevance of changes in the intervention group compared with the changes in the waiting group. For the global T score of the CBCL/4–18, the effect size value was d = 0.49, for the global complaint score of the GBB-KJ d = 0.36, and for the perceived stress as measured with the SSK d = −0.12. For the CBCL syndrome subscales, the effect size values ranged between d = 0.05 (Bodily Complaints) and d = 0.51 (Other Behavior Problems). The strongest effects occurred in the dimensions Social Withdrawal (0.45), Anxiety/Depression (0.36) and Other Behavior Problems (0.51).

Subjective Evaluation of Goal Attainment

The results of the subjective goal attainment scales are demonstrated in Figure 1. At the end of the intervention, 56% of the children and adolescents reported that they had partially attained their individual therapy goals and 38% reported a complete goal attainment. This result is consistent with the parent-reported goal attainment (30% complete and 55% partial goal attainment). At 3 months postintervention 74% of the parents confirmed that the

attainment of the individual goals that had been defined before intervention was persistent at least in part. As reported by the parents in the follow-up telephone interview, 6% of the children and adolescents continued with the ART at home on a daily base, 27% used the relaxation method one to three times per week, and 31% performed the ART one to three times per month.

DISCUSSION

The descriptive data of the psychometric instruments at T_1 demonstrate a moderate level of behavioral and emotional symptoms in our study group compared with gender- and age-related norms. The profile of behavioral, emotional, and somatic symptoms in the study group showed primarily internalizing symptoms, as measured in the parent-report CBCL. The variance in most of the scales indicates that some of the participants had more severe symptoms, whereas others were about the average or beneath the average level of their normative peers as measured by the broadband instruments. All children and adolescents applied for the study because of parent-

TABLE 3
Two by Two Repeated-Measures Analyses of Variance for Group (Therapy Group $n = 35$, Control Group $n = 15$) and Time

Dependent Variable	T1 Therapy Mean	T1 Therapy SD	T1 Control Mean	T1 Control SD	T2 Therapy Mean	T2 Therapy SD	T2 Control Mean	T2 Control SD	Main Effect (group) F	df1/df2	p	Main Effect (time) F	df1/df2	p	Interaction Effect (group × time) F	df1/df2	p
CBCL 4–18																	
Social Withdrawal[a]	3.4	2.7	3.4	2.0	2.2	2.8	3.2	2.2	0.50	1/48	.484	4.95	1/48	.031*	2.49	1/48	.121
Bodily Complaints[a]	2.9	2.8	2.1	1.8	2.0	1.6	2.1	2.1	0.34	1/48	.564	2.41	1/48	.127	2.41	1/48	.127
Anxiety/Depression[a]	6.3	5.0	6.1	4.5	4.3	4.2	5.6	3.7	0.20	1/48	.655	4.47	1/48	.040*	1.75	1/48	.192
Social Problems[a]	2.1	2.1	2.7	2.7	1.9	2.4	2.7	2.4	1.01	1/48	.319	0.30	1/48	.585	0.08	1/48	.785
Obsessive-Compulsive[a]	1.0	1.1	0.7	1.0	0.5	0.9	0.7	1.4	0.02	1/48	.890	2.42	1/48	.126	4.08	1/48	.049*
Attention Problems[a]	5.5	3.9	5.7	4.3	4.1	3.4	4.9	3.7	0.19	1/48	.669	8.65	1/48	.005**	0.44	1/48	.510
Delinquent Behavior[a]	2.1	2.0	1.7	1.8	1.7	1.8	1.9	2.0	0.03	1/48	.858	0.17	1/48	.896	2.56	1/48	.116
Aggressive Behavior[a]	8.9	5.6	8.9	6.6	6.6	6.2	8.3	5.6	0.27	1/48	.609	6.57	1/48	.014*	2.21	1/48	.144
Other Behavior Problems[a]	6.9	4.1	6.3	4.4	3.7	2.7	6.1	4.7	0.74	1/48	.395	11.79	1/48	<.001***	8.42	1/48	.006**
Internal T score	63.6	9.0	62.7	7.9	58.0	9.8	61.3	9.6	0.22	1/48	.644	8.37	1/48	.006**	3.17	1/48	.081†
External T score	57.7	9.1	57.5	9.2	53.9	9.6	57.1	7.2	0.31	1/48	.582	6.24	1/48	.016*	4.08	1/48	.049*
Global T score	62.5	8.4	62.1	8.9	56.6	9.6	61.1	9.2	0.60	1/48	.441	13.72	1/48	<.001***	6.93	1/48	.011*
SSK																	
Overall perceived stress (stanine)	5.5	1.7	4.8	2.2	2.4	2.0	2.1	1.5	0.58	1/47	.450	182.58	1/47	<.001***	0.09	1/47	.769
GBB-KJ																	
Overall complaints[a]	28.7	14.6	34.1	19.5	20.7	16.8	26.5	17.0	1.38	1/48	.246	19.73	1/48	<.001***	0.01	1/48	.907

Note: CBCL = Child Behavior Checklist; SSK = Childhood Stress and Coping Questionnaire; GBB-KJ = Gressen Subjective Complaint List for Children.
[a] Raw scores.
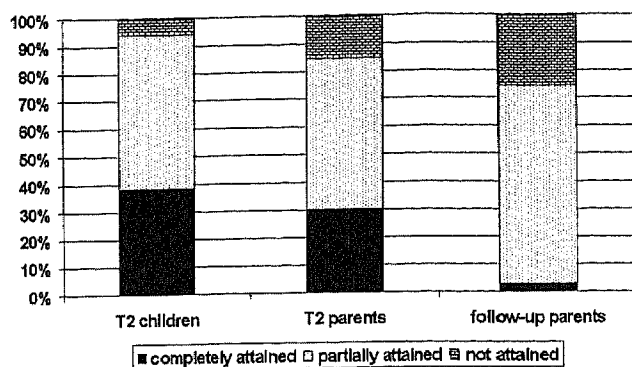* $p <.05$; ** $p <.01$; *** $p <.001$; † $p <.10$.

Fig. 1 Individual goal attainment scaling of the children and of the parents at the end of intervention and of the parents in a 3-month follow-up.

reported behavioral and/or emotional symptoms, and the great majority of the participants had not sought psychotherapeutic or medical help before. Summarizing the descriptive results before intervention, the study group can be regarded as representative for a primary care or pediatric outpatient sample with heterogenous behavioral and emotional symptoms.

As regards the effectiveness of ART with children and adolescents, the first hypothesis of this study was confirmed. From a pre-intervention level of 12 T score values above average in the CBCL global scale, the study group improved significantly about half a standard deviation after the intervention. This improvement appeared both in the Externalizing and Internalizing dimensions, independent of the pre-intervention level of symptoms. The waiting-list control group did not improve significantly in the Behavioral and Emotional symptom scores of the CBCL. The results of the analyses of variance indicate a significant differential effect of the intervention in the global CBCL score and in the externalizing CBCL score. In the Internalizing CBCL score we found a nonsignificant trend in the group × time interaction effect. Specific effects of the intervention could be observed in the Obsessive-Compulsive symptom scale and on the Other Behavior Problems scale. The latter finding could have been expected, as our study sample was not severely disturbed in the secondary emotional and behavioral dimensions of the CBCL. Our results are consistent with the literature about the effectiveness of ART with children and adolescents (Heinrichs and Neidhardt, 1998; Kaltwasser and Breitenbach, 1986; Kröner and Steinacker 1980; Kröner and Langenbruch, 1982). Our findings support the hypothesis in which we proposed a nonspecific broadband effectiveness of ART, at least from the parental

perspective. Indeed, we cannot exclude a Rosenthal effect (Rosenthal and Jacobson, 1968) on the parents, who were not blind to the intervention. Certainly, the parents had some investment in it, including praising the home practicing and facilitating transportation of their children to the group training, and presumably they had positive expectations about the outcome of the intervention.

Our second and third hypotheses have to be rejected. According to the results of the analyses of variance, the intervention group was not superior to the control group in reducing multiple self-reported somatic complaints or perceived stress. We found significant time effects, but no group × time effects in the self-report measures. Regarding the somatic complaints, we found no significant group × time effect but a modest effect size value of the intervention compared with the control. The intervention group and the waiting-list control group improved significantly both in the self-reported overall somatic complaints as measured by the GBB-KJ and in the perceived extent of stress as measured by the SSK. The improvement of the waiting-list group might be explained by the expectation of getting help soon by the intervention, which began immediately after the T_2 assessment for the control group. The contrast between the perspectives of children and parents might be responsible for the differential findings. The main effects of the intervention occurred in the parental perspective. It is proposed that parents judge the behavior of their children more objectively than the children themselves, especially in the external behavior symptoms.

The effect size values of $d = 0.49$ in the CBCL global score and $d = 0.36$ in the GBB-KJ indicate a low to medium effectiveness of ART according to the criteria of Cohen (1988). In a meta-analysis of child and adolescent psychotherapy, Weisz et al. (1995) reported a mean effect size of 0.72 for behavioral relaxation treatment. For behavioral treatments in general, the authors found a mean effect size value of $d = 0.76$. In another meta-analysis, Hoag and Burlingame (1997) reported a mean effect size value of $d = 0.61$ for child and adolescent group treatments. The lower effect size in our study might be a result of our decision to use broadband measures instead of specific instruments measuring individual target problems. The effect of broadband versus specific outcome instruments on effect size values has been demonstrated in the meta-analysis of Weisz et al. (1995). Another explanation for the lower effect size values in our study, compared with other therapy studies, could be the heterogeneous and often chronic symptoms in our sample.

The results of the goal attainment scaling demonstrate that in this study the majority of the children and their parents subjectively perceived an improvement in their specific individual problem behavior. This improvement persisted 3 months postintervention as reported by the parents. Because goal attainment scaling was not performed in the control group after the waiting time, we cannot exclude spontaneous approaches to individual therapy goals without intervention.

Only one child dropped out of the study during the intervention. According to the parent report, many children and adolescents continuously used ART at home after the end of the group intervention. This report might be biased by the investment of the parents into the method and should be interpreted cautiously. Anyway, the low dropout rate and the parent report indicate the acceptance of the relaxation technique and its potential to be adopted as a coping strategy in the home environment.

Limitations

Some limitations of our study have to be considered. First, the sample size was relatively small, especially of the control group. Because of the limited statistical power, type II errors may have resulted, and some effects of the intervention may not have been detected. Second, because of the heterogeneous study group regarding type, frequency, and intensity of behavior symptoms, symptom-specific treatment effects could not be investigated with sufficient statistical power. Third, the results of the goal attainment scaling should be interpreted cautiously because the interviewer was not independent and could not be blind to the group affiliation. Fourth, differential effects of ART on children and adolescents with different manifestations of clinical symptoms or subclinical behavior problems should be analyzed in future studies. Fifth, the restricted social and cultural background of our sample with European white, primarily middle class participants from intact families may further limit the generalization of our findings to other populations. Sixth, long-term effects of the intervention have not been investigated in our study. The intervention phase of eight sessions may have been too short to promote integration of relaxation training into the daily life of children and adolescents. Some authors suggest that children should be taught ART for up to 6 months to establish stable treatment effects (Kruse, 1994; Langenkamp et al., 1982). Future intervention studies of ART in children and adolescents should address the long-term persistence of treatment effects. At

last, our waiting-list control group design allowed no blinding of the participants against the intervention. Future studies should evaluate the intervention in comparison to alternative or sham treatments.

Clinical Implications

Although the effect size values in our study are relatively small, it has to be considered that the improvement in behavioral and emotional dimensions has been achieved within a therapy time of only 4 hours for 9 to 12 participants per group. According to our results, the method is a promising basic psychotherapy for children and adolescents with mild to moderate mental health symptoms. ART as a group intervention is useful in preventive and primary care settings, and it has supportive effects on children with symptoms on a subclinical level.

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Stunting of Growth as a Major Feature of Anorexia Nervosa in Male Adolescents. Dalit Modan-Moses, MD, Amit Yaroslavsky, MD, Ilia Novikov, PhD, Sharon Segev, BSc, Anat Toledano, BSc, Edith Miterany, MD, Daniel Stein, MD

Objective: To assess growth retardation in male adolescent patients who have a diagnosis of anorexia nervosa (AN) and the effect of weight restoration on catch-up growth. *Methods:* Medical charts of all male adolescent AN patients (n = 12) who were admitted to the Pediatric Psychosomatic Department at the Sheba Medical Center from January 1, 1994, to December 31, 1998, were reviewed. Height and weight measurements were obtained before the onset of AN, at admission, and thereafter routinely during hospitalization and follow-up. *Results:* Eleven patients exhibited growth retardation during the course of their illness, as evident in a decrease in their height standard deviation score (SDS). The mean height SDS at the time of admission (–0.81 ± 0.93) was significantly lower than the premorbid SDS (–0.21 ± 0.91). Weight restoration resulted in accelerated linear growth (up to 2 cm/mo) in all patients. Positive weight gain (weight gain rate > 1 kg/y) was associated with a mean height gain of 6.97 ± 6.48 cm/y, whereas weight loss or failure to gain weight (weight gain rate ≤ 1 kg/y) was associated with a mean of 2.7 ± 3.9 cm/y. This between-group difference was highly significant. Complete catch-up growth was not achieved in 9 of 12 patients. There was a trend for the mean adult final height SDS (–0.52 ± 0.84) to be higher than the admission height SDS but lower than both the premorbid height SDS and the midparental target height SDS (–0.21 ± 0.79). *Conclusions:* Linear growth retardation was a prominent feature of AN in our sample of male adolescent patients, preceding, in some cases, the reported detection of the eating disorder. Weight restoration, particularly when target weight is based on the premorbid height percentile, may be associated with significant catch-up growth, but complete catch-up growth may not be achieved. Pediatrics 2003;111:270–276.